Partial English Translation of Japanese Patent Laying-Open No. 10-204155

[Title of the Invention]

Epoxy Resin Composition

[0006]

[Embodiments of the Invention]

Components are each described now. According to the present invention, the crystalline epoxy compound contains at least two epoxy groups in a molecule, having a structure not particularly limited except that the epoxy compound should be crystalline and solid at room temperature. Examples of the crystalline epoxy compound are biphenyl epoxy compound, bisphenol epoxy compound, and stilbene epoxy compound. In terms of reliability in relation to moisture resistance of a semiconductor-encapsulating resin composition, preferably the content of such ionic impurities as Na and Cl ions is as low as possible and, in terms of curing property, the equivalent weight of epoxy is preferably 150-300 g/eq.

[0007]

The phenolic resin curing agent according to the present invention is not limited to a particular one except that the phenolic resin curing agent should contain a phenolic hydroxyl group in a molecule. Examples of the curing agent are phenol novolac resin, xylylene modified phenol resin, triphenolmethane resin and modified resins thereof. In terms of curing property, the equivalent weight of the hydroxyl group is preferably 80-250 g/eq.

[0008]

According to the present invention, the fused silica includes broken

fused silica with the content of at least 50 wt% and remaining fused silica which may be spherical or round silica. Moreover, with respect to the total content of the fused silica, at least 15 wt% of fused silica has a particle size of no more than 5 μm. The ratio of the silica with the particle size of no more than 5 μm may be measured by a laser diffractometer for determining the particle-size distribution (model 715, manufactured by CILAS), and the shape of the silica may be analyzed by a microscope with a magnification of approximately 100 times. Regarding laser marking on the surface of a molded product of the resin composition containing the fused silica, the anchoring effect of at least 50 wt% of the broken silica included in the fused silica decreases deep depressions that are caused in conventional products due to separation of a part of such a filler as silica from the product, and accordingly, printed characters have decreased shades on their surface. Moreover, the broken silica and particulates effectively produce diffused reflection to enhance the contrast of printed characters, providing clear and sharp laser marking. If the content of the broken fused silica in the fused silica is less than 50 wt%, a greater amount of such a filler as silica is separated in printing, which increases shades on the surface of printed characters, without diffused reflection generated by corners of broken fused silica. Accordingly, no satisfactory laser markability is achieved.

[0009]

Moreover, with respect to the total content of fused silica, at least 15 wt% of silica has a particle size of no more than 5 μm and, the presence of this silica of no more than 5 μm allows rough or irregular edges of printed characters to be smoothed, which provides the effects that the characters are clear and legible and that the characters are prevented from being chipped and blurred due to the roughness or irregularity of edges. Accordingly, a superior markability is achieved. If the content of particles

with a particle size of no more than 5 μm is less than 15 wt%, the effective diffused reflection is not obtained which means that the roughness or irregularity, chipping and blur of edges cannot be avoided, so that no satisfactory markability is achieved. The content of the fused silica is preferably 74-86 wt% with respect to the total resin composition. If the content is less than 74 wt%, colors of characters produced by resin have a greater influence. Then, in order to achieve satisfactory laser markability, any measure must be taken for preventing thermal discoloring of the resin for example. If the content exceeds 86 wt%, the fluidity of resin is deteriorated which means that the resin composition has insufficient fluidity. There is no particular limitation concerning, for example, the method of producing the fused silica to be used according to the present invention. The fused silica preferably has a maximum particle size of no more than 150 μm in order to allow fine sections of a mold to appropriately be filled with the silica in a molding process.